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FACTORS IN BREASTFEEDING INITIATION AMONG CENTRAL KENTUCKY WIC AND NON-WIC PARTICIPANTS

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FACTORS IN BREASTFEEDING INITIATION AMONG CENTRAL KENTUCKY WIC AND NON-WIC PARTICIPANTS

Thesis

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requirements for the degree of Master of Science in the
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By
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ABSTRACT

FACTORS IN BREASTFEEDING INITIATION AMONG CENTRAL KENTUCKY WIC AND NON-WIC PARTICIPANTS

Vital statistics data were statistically analyzed to determine who is breastfeeding in central Kentucky and if factors differ between those in a WIC and non-WIC population. The sample consisted of 479 postpartum women aged 18-44 in central Kentucky. Participants in the study were analyzed as a whole, then divided by their participation in the WIC program (n=304) or non-participation in the WIC program (n=175). Variables recorded in the vital statistics form were analyzed. These variables included age, education level, marital status, and ethnicity of the mother, household income status, and gender, gestational age, and birth weight of the infant. In the population studied, education level, ethnicity, marital status, household income status, and gestational age of the infant were significantly different between mothers who initiated breastfeeding and those who did not. In the WIC population, mothers were more likely to initiate breastfeeding if they were of non-white ethnicity or if the infant was born at greater than 37 weeks gestation; whereas, in the non-WIC population, mothers were more likely to initiate breastfeeding if they had some college or a college degree or if they were not enrolled in Medicaid. WIC participants were significantly less likely to initiate breastfeeding than non-WIC participants.

KEYWORDS: Breastfeeding, Breastfeeding Initiation, Breastfeeding Factors, WIC, Kentucky

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Chapter One: Introduction

"Imagine the world had created a new 'dream product' to feed and immunize everyone on earth. Imagine also that it was available everywhere, required no storage or delivery, and helped mothers plan their families and reduce risk of cancer. Then imagine that the world refused to use it." Hagan 2011 This quote by Frank Oski, Department of Pediatrics former director at John Hopkins University, highlights the potential benefits of breastfeeding if it were to be utilized to a greater extent.

Problem Statement

Decreased health care costs and fiscal costs associated with breastfeeding would be especially beneficial in the at-risk clientele of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). However, breastfeeding rates are lower among WIC participants than the general population. Duration of breastfeeding among participants in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) lags behind that of non-participants, including those who are WIC- eligible but do not participate. (Dieterich, Felice, O'Sullivan, Ramussen, 2013) Despite WIC's aim to promote breastfeeding, research suggests that offering free formula to its participants goes against the program's objectives.

Healthy People 2020's goal to promote quality of life, healthy development, and healthy behaviors across all life stages is measured by objectives such as MICH 21.1 which states that 81.9 percent of infants will ever be breastfed. The Bellagio Child Survival Study Group identified breastfeeding during the first year as one of the most important strategies for improving child survival. (Jones, Steketee, Black, Bhutta, Morris, 2003) The Healthy People goals give health care providers and organizations numbers to strive for; however, disparities still exist across states, ethnicities, age groups, to name a few.

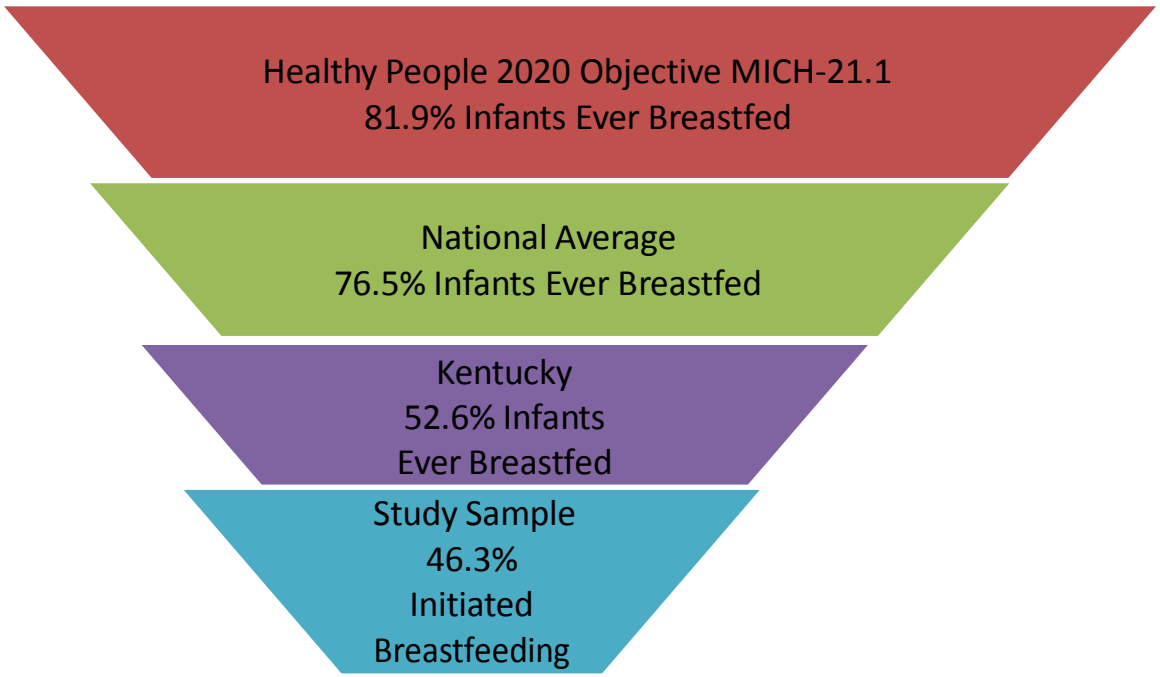
Justification

Breastfeeding provides many health, nutritional, economical and emotional benefits to mother and baby. These benefits are particularly important to those eligible for WIC including low-income pregnant, breastfeeding, and non- breastfeeding postpartum women, and infants and children up to age five who are found to be at nutritional risk. There were 8,960,593 WIC participants in the United States for the 2011 fiscal year. (Food and Nutrition Services, 2014) This study is of significance to WIC coordinators especially because many resources are funneled into breastfeeding promotion through counseling and breastfeeding educational materials, peer counselors, extended eligibility, enhanced food packages, and supplementation of breast pumps. This research will provide a profile of the target population who are breastfeeding and non-breastfeeding.

Government programs are constantly seeking to improve in areas highlighted in the Healthy People 2020 objectives. The rate of infants who were ever breastfed in the United States is 76.5%. Currently, Kentucky is ranked 49th in the United States in

attaining this objective with 52.6% of infants ever having been breastfed. The figure below shows the target goal for the nation to attain by 2020 compared to where the nation and Kentucky are in the year 2013 and finally what percent of the sample under review initiates breastfeeding.

Figure I Breastfeeding Status



Purpose Statement

What are the factors involved in breastfeeding initiation among mothers in central Kentucky? The purpose of this study is to identify the significance of selected demographic factors in the vital statistics record in central Kentucky; such as education, marital status, income level, among others, involved in breastfeeding initiation in a WIC and non-WIC population.

Research Hypotheses

It is hypothesized that:

H1: There will be a significant difference in the selected demographic factors between a group of breastfeeding and non-breastfeeding mothers in central Kentucky.

H2: There will be a significant difference in the proportion of WIC versus non-WIC participants who breastfeed in the central Kentucky region.

Research Objectives

The objectives of this research are:

O1: Identify demographic factors that differ between breastfeeding and non-breastfeeding mothers.

1.1 Education level of the mother

1.2 Age of the mother

1.3 Ethnicity of the mother

1.4 Marital status of the mother

1.5 Income status of household

1.6 Gender of the infant

1.7 Birth weight of the infant

1.8 Gestational age of the infant

O2: Identify demographic factors that differ in the WIC versus Non-WIC population for breastfeeding initiation.

1.1 WIC participation

1.2 Education level of the mother

1.3 Age of the mother

1.4 Ethnicity of the mother

1.5 Marital status of the mother

1.6 Income status of household

1.7 Gender of the infant

1.8 Birth weight of the infant

1.9 Gestational age of the infant

Assumptions

It is assumed that all information is recorded correctly on the form because it is the government issued vital statistics form that documents breastfeeding data at birth. It is also assumed that all births are registered. A test of the completeness of birth registration, conducted on a sample of births from 1964 to 1968, showed that 99.3% of all births in the United States during that period were registered. (Kovar, 1989)

Limitations

In using ex-post facto data there are limitations in what information is available. The researcher was not involved in developing the questions asked of the participants and therefore could not ask any probing questions to dig further into the information provided such as attitudes or intentions of the mother and father regarding breastfeeding. In the question on the vital statistics document regarding breastfeeding, there is only a yes or no check box not allowing for the mother to indicate if they are exclusively breastfeeding or supplementing with formula. It would be of interest to include participants younger than eighteen years of age because statistically they have the lowest breastfeeding rates, however they were not included in this sample due to the vulnerability of this subset of the population.

Chapter Two: Review of Literature

History of Breastfeeding

Throughout most of history, breastfeeding was the norm, even if it was not the mother who was feeding the infant. In the distant past, wealthy women had access to wet nurses, who breastfed their children for them. After the industrial revolution, the number of wet nurses declined. By the late 19th century, infant mortality from unsafe artificial feeding became an acknowledged public health problem. This was likely due to feeding infants un-pasteurized cows' milk which is a food borne illness risk and has a much greater percent of the milk protein casein than breast milk leading to difficulties in digestion by infants. Public health nurses addressed this by promoting breastfeeding and home pasteurization of cows' milk. In the 20th century, commercial formula companies began to market formula as a safer alternative to cows' milk. With the support of physicians, the widespread use of formula as a breast milk substitute for healthy mothers and babies emerged. An entire generation of women and physicians grew up not viewing breastfeeding as the normal way to feed babies. Despite the resurgence of breastfeeding in the late 20th century in the United States, breastfeeding and formula feeding continued to be considered virtually equivalent, representing merely a lifestyle choice parents may make without significant health consequences (Wright, 2001). With all of the research done in the 21st century showing health benefits to the infant and mother, infant nutrition should be considered a public health issue and not only a lifestyle choice. (Gartner, 2005)

Breastfeeding Rates

International breastfeeding rates

Exclusive breastfeeding is recommended up to six months of age, with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond. (Butte, Lopez-Alarcon, Garza, 2002) However, globally these recommendations are not being met. In a study using a global database of infant and young child feeding maintained by the United Nations Children's Fund, the prevalence of exclusive breastfeeding among infants younger than six months in developing countries was only 39% in 2010. The prevalence of exclusive breastfeeding increased between 1995 and 2010 modestly in almost all regions in the developing world, with the biggest improvement seen in West and Central Africa. (Cai, Wardlaw, & Brown, 2012). According to UNICEF global databases 2012, from Multiple Indicator Cluster Surveys, Demographic and Health Surveys and other national surveys, the global average of early initiation of breastfeeding was 42% for 2007-2011. In the least developed countries more infants are placed at the breast within one hour of birth (52%) than in the world average (42%). (UNICEF, 2013)

Nationwide breastfeeding rates

The rate of initiation of breastfeeding for the total US population based on the latest National Immunization Survey data are 75%. This overall rate, however, diminishes significant socio-demographic and cultural differences. For example, the breastfeeding initiation rate for the Hispanic or Latino population was 80.6%, but for the non-Hispanic black or African American population, it was 58.1%. Among low-income

mothers (participants in WIC), the breastfeeding initiation rate was 67.5%, but in those with a higher income (ineligible for WIC) it was 84.6%. Breastfeeding initiation rate was 37% for low-income non-Hispanic black mothers. Similar disparities are age-related; mothers younger than 20 years initiated breastfeeding at a rate of 59.7% compared with the rate of 79.3% in mothers older than 30 years. The lowest rates of initiation were seen among non-Hispanic black mothers younger than 20 years, in whom the breastfeeding initiation rate was 30%. (CDC, 2012)

Kentucky breastfeeding rates

Kentucky has a breastfeeding initiation rate of 52.6 percent compared to a 76.5 percent national rate, giving the Commonwealth the ranking of number 49th for breastfeeding rates. (Breastfeeding Report Card, 2013) Kentucky also has one of the lowest breastfeeding duration ratings with only 29.6% of infants being breastfed at six months compared to 43% nationally. (Centers for Disease Control and Prevention, *2010*)

Benefits of Breastfeeding

Health benefits to the infant

According to recent reviews by the American Academy of Pediatrics (2005) and the Agency for Healthcare Research and Quality (Ip et al., 2007) , infants who are breastfed have lower rates of post-neonatal mortality, are less likely to contract bacterial meningitis, otitis media, and other infectious diseases, and as they age, less likely to develop asthma or be obese. (Jiang, Foster, Gibson-Davis, 2010) In an analysis of data from the 2005 National Immunization Survey, researchers calculated that if 90% of US families could comply with the globally accepted recommendations to breastfeed

exclusively for 6 months, the United States could save 13 billion dollars per year and prevent an excess 911 deaths annually, 95% of which would be of infants. (Bartrick Reinhold, 2010) Hauck and colleagues analyzed studies conducted during 1966–2009 and found that, compared to formula-fed infants, those who were ever breastfed had a 45% reduction in SIDS risk. (Hauck, et al, 2011) As reported in *The Lancet*, it has been estimated that optimal breastfeeding of children under two years of age has the potential to prevent 1.4 million deaths in children under five in the developing world annually. (UNICEF, 2012)

Health benefits to the mother

Research shows that breastfeeding initiation has benefits for the mother including reducing maternal bleeding after delivery, promoting involute uterus, facilitates metabolism and postpartum weight loss, reduces stress, and delays ovulation. If breastfeeding is continued it has been found to increase postpartum weight loss, prolong lactational amenorrhea, decrease visceral adiposity, reduce risk for type two diabetes, cardiovascular risk, breast and ovarian cancer risk. (Godfrey, Lawrence, 2010 & Jiang, Foster, Gibson-Davis, 2010) In addition to physical benefits there has also been research investigating connections to decreased depression and other psychological benefits to the mothers who breastfeed.

Fiscal benefits

In addition to specific health advantages for infants and mothers, economic, family, and environmental benefits have been described. Breastfeeding may save 400 dollars per child in foregone medical costs in the first year of life alone (Lawrence &

Lawrence, 2005 & Jiang, Foster, Gibson-Davis, 2010). In an earlier analysis of the costs of formula-feeding, other investigators found that, compared to 1,000 infants exclusively breastfed for 3 months, 1,000 infants never breastfed required 2,033 more office visits, 212 more days in the hospital, and 609 more prescriptions in the first year. (Ball Wright, 1999) In a study done by Montgomery and Splett on the economic benefits of breastfeeding, data indicated substantial savings to Medicaid and WIC for the breastfeeding cohort at all levels of duration versus the formula fed cohort, with a net benefit of 160.87 dollar average over six months per infant-mother pair. (Montgomery, Splett, 1997)

In addition to the direct costs above there are also indirect costs and benefits to breastfeeding such as decreased parental employee absenteeism and associated loss of family income; more time for attention to siblings and other family matters as a result of decreased infant illness; decreased environmental burden for disposal of formula cans and bottles; and decreased energy demands for production and transport of artificial feeding products. These savings for the country and for families would be offset to an intangible extent by increased costs for physician and lactation consultations, increased office-visit time, and cost of breast pumps and other equipment, all of which should be covered by insurance payments to providers and families. (American Academy of Pediatrics, 2005)

Breastfeeding Factors

Demographic factors of the mother

Jacknowitz (2002) finds that of the demographic characteristics examined maternal age, maternal education, race/ethnicity, and geographic location of birth were strong predictors of breastfeeding during the time period of 1991 to 2002. Younger mothers are less likely to breastfeed than older mothers with rates ranging from 56.2 to 76.4%. Less educated mothers are less likely to breastfeed than more educated mothers, with initiation rates increasing from 55.1 to 81.2% with increased education level. Non-Hispanic Black mothers (53.9%) are less likely than mothers of white (73.4%) or Hispanic (70.7%) ethnicities to breastfeed. Mothers residing in the Western states [Mountain (81%) and Pacific (81.5%) Census regions] have higher breastfeeding rates than other regions, whereas mothers living in the East South Central division (57%) have considerably lower breastfeeding rates than all other regions. Kentucky lies within the East South Central region. (Wenjun, Acosta, 2002) The rates of breastfeeding initiation were highest for children born to mothers who were 30 years of age or older, who had more than a high school education, and whose annual household income was 400% of the federal poverty level. A significantly smaller proportion (72.6%) of children of United States-born mothers were breastfed, compared with children of foreign-born mothers (89.6%). Children living in 2-parent biological or adoptive families, through milk banks, were more likely to have been breastfed (80.4%), compared with children in other types of households. (Jones et al 2011)

Most significantly, racial and ethnic disparities in breastfeeding initiation and duration exist in the United States, with black women having lower rates of both, compared with white women. (Wambach, Cohen, 2009) Rates of breastfeeding initiation were significantly higher among Hispanic children (81.8%) and lower among non-Hispanic black children (55.5%) than among non-Hispanic white children (76.2%). Although data suggest that Latina women have breastfeeding rates similar to those of white women, Hispanic and black women have the highest rates of formula supplementation of breast-fed infants before 2 days of life. The gap between current breastfeeding practices and the Healthy People 2020 breastfeeding goals is widest for black women compared with all other ethnic groups. (Chapman, Perez-Escamilla, 2012)

Economic factors

Based on data from 79 countries with estimates using background information, figures show little difference in the prevalence of exclusive breastfeeding by residence or household wealth level. (UNICEF, 2013) However, low-income mothers in the United States have been found to be less likely than the general population to initiate and to continue breastfeeding. Breastfeeding rates among WIC women, both while they and their infants are in the hospital immediately after the babies' birth as well as when their babies are 6 months of age, have historically been significantly lower than those of non-WIC women. For example, 57 percent of WIC women initiated breastfeeding while in the hospital in 2000, compared to 78 percent of non-WIC women. (Oliviera, 2003)

An additional challenge is the result of recent welfare reform legislation that emphasizes working. A mother who works outside the home must have a place and time to nurse her baby or be able to express and store her milk for bottle feeding. The types of businesses that employ Medicaid and WIC women are believed to be less likely to have the facilities and procedures to accommodate these daily breastfeeding needs. (Oliviera, 2003)

Characteristics of the infant

Among premature infants, formula feeding increases the risk for necrotizing enterocolitis, delayed brainstem maturation, decreased scoring on cognitive and developmental tests, and delayed visual development. As a result, there are many interventions designed to increase breast milk consumption in preterm infants. (Merewood et al 2006) Many mothers of preterm infants struggle to achieve a full milk production for many reasons, the mechanisms of which are still unclear. Strategies to enhance milk volume include early, frequent simultaneous expression of milk combined with breast massage and a reduction of stress. (Geddes, Hartmann, Jones, 2013) Results from a study by Jones, et al. also indicated that although very low birth weight (VLBW) was associated with an increased likelihood of being breastfed, it also was associated with a decreased likelihood of being breastfed exclusively, compared with normal or above-normal birth weight. (Jones et al 2011) Children with a very low birth weight (less than 1500 g) were most likely to have been breastfed, and those with a moderately low birth weight (1500 to 2500 g) were least likely to have been breastfed. (Jones et al 2011)

The Special Supplemental Nutrition Program for Women, Infants, and Children

History of WIC

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides nutritious food supplementation, nutrition education, and screening and referral to health and social services to pregnant, breastfeeding, and non-breastfeeding postpartum women, and infants and children up to 5 years of age. The food package contains foods that are high in certain nutrients, such as protein, iron, calcium, vitamin A, and vitamin C, in order to meet the objective of the program which is to improve fetal growth and development, improve the health and development of infants and young children, and increase access to needed services. (Colman, 2012)

WIC also supports the initiation and continuation of breastfeeding among postpartum women who choose to breastfeed. Postpartum women who are not breastfeeding only receive WIC for six months, while those who are breastfeeding may participate for up to one year. WIC offers breastfeeding mothers peer counseling and support, education about the benefits of breastfeeding, access to free breast pumps and nursing supplements as well (Food and Nutrition Service U.S.D.A, 2014). Breastfeeding mothers are provided a food package that is higher in relative value, in part to compensate these women for the infant formula they do not receive (Food and Nutrition Service U.S.D.A, 2014). Infants who are not breastfed are provided free or reduced cost formula up to one year of age.

WIC is not an entitlement program, so the number of participants served each year depends on available funding and the cost of running the program. To deal with the possibility that local programs may not be able to serve all eligible people, WIC uses a priority system to allocate available caseload slots to eligible applicants (Fox, 2004). Participants must meet income requirements and have a determination of nutrition risk. Income requirements show the participant's gross income between 100 and 185% of the U.S. Poverty Income Guidelines or eligible to receive SNAP benefits, Medicaid, or Temporary Assistance for Needy Families. According to the WIC eligibility requirements, "Nutrition risk" means that an individual has medical-based or dietary-based conditions such as anemia, underweight, history of poor pregnancy outcome, or a poor diet (Food and Nutrition Services U.S.D.A, 2012).

WIC program effectiveness

Since the early 1970s, WIC has expanded. In 1974, the program had 88,000 participants; by 2006, the program had 8 million participants, served by 2,200 agencies throughout the country (United States Department of Agriculture, 2006). Program participants represent one-half of all children less than one year and one-quarter of children between ages one and four (Oliveira, Racine, Olmstead, & Ghelfi, 2002). One in every $10 spent on food assistance programs in the United States is devoted to WIC (United States Department of Agriculture, 2006).

Evidence is compelling and indicates strongly that WIC increases mean birth weight, reduces the incidence of low birth weight, and decreases birth-related Medicaid costs. In comparing the women receiving WIC to other women whose deliveries were

paid for by Medicaid, research shows favorable effects of WIC. In a study by Bitler and Currie titled Does WIC Work?, WIC was associated with being 1.4-1.5 times as likely to initiate prenatal care in the first trimester; being only 0.7 times as likely to have a low birth weight infant or premature infant; and only 0.9 times as likely to be in the lowest quartile or decile of birth weight conditional on gestation. WIC participants are only 0.9 times as likely to have the infant admitted to the ICU. The data also show reduction of about one night in the number of nights that the infant spends in the hospital after birth; and WIC is associated with increases in maternal weight gain, gestation, and birth weight. Findings from the Oliveira and Gundersen study indicate that WIC participation significantly increases children's intakes of iron, vitamin B6, and folate. (Oliveira and Gunderson, 2000) The only negative effect of WIC is to decrease the probability of initiating breastfeeding with WIC purchases accounting for more than half of all the infant formula sold in the United States. (Neuberger, 2010) The average reduction of almost one night's hospital stay per infant, and a quarter of a night's stay in hospital per woman, would be enough to repay the cost of the WIC benefits by itself. The WIC infants are also 14 percent less likely to end up in an intensive care unit, at a cost of thousands of dollars per day. (Bitler & Currie, 2005)

Breastfeeding promotion effectiveness

Despite a twenty-year breastfeeding promotion effort, breastfeeding rates among WIC participants have remained depressed. Federal rules require that WIC agencies spend 21 dollars per participant (roughly half the value of the WIC food package) on education and outreach to promote breastfeeding every fiscal year (Food and Nutrition Service U.S.D.A, 2005). The literature examined predictors of breastfeeding behaviors

using descriptive statistics. A review of these studies have demonstrated that women who are African American, less educated, low-income, and younger are less likely to breastfeed than other women. These demographic characteristics are also associated with higher rates of WIC participation. Therefore, it is not surprising that studies have found a negative association or no association between WIC participation and breastfeeding. (Fox, 2004)

The available research on WIC's impact on the breastfeeding behaviors of WIC participants provides no firm basis for conclusions. Moreover, breastfeeding promotion efforts in the WIC program have expanded substantially since the time most of these studies were conducted. (Fox, 2004) More recent studies suggest that selection and not program impact is a major factor. Regardless of program incentives, that WIC participants are less likely to breastfeed is not surprising because they lack many of the characteristics associated with breastfeeding. As compared to low-income mothers not in the program, WIC mothers were more likely to have dropped out of high school (26% versus 6%), lower incomes ($20,340 versus $45,650), are younger, are less likely to be married (37% versus 82%), and engage in more risky health behaviors, such as smoking (Bitler & Currie, 2005; Gundersen, 2005; Joyce et al., 2005). They were also more likely to be minority (nearly two-thirds were African American), and they had lower scores on an intelligence test. (Jiang, Foster, Gibson-Davis, 2010)

Summary

In summary there is a great deal of research done on a large scale regarding breastfeeding and the effectiveness of WIC. However, the results are inconclusive as to whether the breastfeeding promotion program through WIC is a barrier or support to breastfeeding. There is a great deal of controversy over whether WIC offering formula is contradicting their efforts to promote breastfeeding or if it is the negative selection bias of the participants in WIC that makes the breastfeeding aspect of the program appear ineffective . Studies have demonstrated that parents who chose to breastfeed their infants had more positive breastfeeding attitudes and were more knowledgeable about the health benefits and nutritional superiority of breastfeeding making intention to breastfeed an important factor in breastfeeding initiation. (Persad, Mensinger, 2008) Breastfeeding is a global issue as well as an issue in central Kentucky and a great deal of funds are being funneled into research and programs aimed at increasing breastfeeding rates.

Implications

This research will give a more focused description of the women in central Kentucky who choose to initiate breastfeeding and who do not choose to initiate breastfeeding. The research also aims to determine if participants in the WIC program are more or less likely to breastfeed than women not in the WIC program. This research will add to the body of existing data that seeks to determine what factors influence breastfeeding rates.

Chapter Three: Methodology

Research Purpose

The purpose of this study is to identify and compare the barriers and supports involved in breastfeeding initiation in both a WIC and non-WIC population of mothers in central Kentucky. These data add to previous research done to determine why some women breastfeed while others do not.

Research Hypotheses

It is hypothesized that:

H1: There will be a significant difference in the selected demographic factors between a group of breastfeeding and non-breastfeeding mothers in central Kentucky.

H2: There will be a significant difference in the proportion of WIC versus non-WIC participants who breastfeed in the central Kentucky region.

Research Objectives

The objectives of this research are:

Obj 1:Identify demographic factors that differ between breastfeeding and non-breastfeeding mothers.

1.1 Education level of the mother

1.2 Age of the mother

1.3 Ethnicity of the mother

1.4 Marital status of the mother

1.5 Income status of household

1.6 Gender of the infant

1.7 Birth weight of the infant

1.8 Gestational age of the infant

Obj 2: Identify demographic factors that differ in the WIC versus Non-WIC population for breastfeeding initiation.

1.1 WIC participation

1.2 Education level of the mother

1.3 Age of the mother

1.4 Ethnicity of the mother

1.5 Marital status of the mother

1.6 Income status of household

1.7 Gender of the infant

1.8 Birth weight of the infant

1.9 Gestational age of the infant

Research Design

The study design was Ex Post Facto, which involves retrospective data. This design used factorial, quantitative characteristics. The information gathered from this dataset was statistically analyzed using SAS 9.3®. For this research project, central Kentucky consisted of Anderson, Boyle, Casey, Fayette, Garrard, Jessamine, Lincoln, Madison, Marion, Mercer, Nicholas, Pulaski, Russell, Rockcastle, Taylor, and Washington counties. It was determined by the University of Kentucky Institutional Review Board (IRB) that the study did not qualify as human subject research under the federal definition and therefore IRB approval did not apply.

Figure II Research Sample Central Kentucky Region

Study Sample

Selection criteria included women between the ages of 18 and 44, who had a live birth in central Kentucky over a ten month period of time from June 2010 to April 2011. These selection criteria were used in order to monitor how many women initiate breastfeeding in central Kentucky as well as other data that may shed light on what

factors affect the decision to breastfeed. Women under 18 years of age were excluded due to the vulnerability of the population. The age range ended at 44 because that was operationally defined as the upper age range of child bearing. Women who delivered a still birth were not included because they are not applicable to a study on breastfeeding. Men were excluded because the vital statistics document does not capture the father's data. Due to the objectives of the study, women were divided by their participation in the WIC program (n=304) or non-participation in the WIC program (n=175). It was unknown whether participants in the study who were not enrolled in WIC were WIC eligible. Of the sample, 283 (59.1%) were married and 196 (40.9) were not married. Of the sample, 427 (89.1%) listed their ethnicity as white and 52 (10.9%) as non-white. Of the population in central Kentucky, 84.4% was white in ethnicity, compared to the sample which was 89.1% white in ethnicity. Of infants in Kentucky, 52.6% were ever breastfed according to the CDC Breastfeeding Report Card for 2013. For the sample collected, 46.3% of infants were ever breastfed.

Table I Sample Demographics Categorical Variables

Variable	WIC Participants n=304	Non-WIC participants n=175
Breastfeeding		
Yes	113 (23.6%)	109 (22.8%)
No	191 (39.9%)	66 (13.8%)
Education Level		
Less than High School Degree, High School Degree, or GED	193 (40.3%)	33 (6.9%)
Some College, AS, BS, MS, PhD	111 (23.2%)	142 (29.7%)
Ethnicity		
White	263 (54.9%)	164 (34.2%)
Non-White	41 (8.6%)	11 (2.3%)
Marital Status		
Married	142 (29.7%)	141 (29.4%)
Not Married	162 (33.8%)	34 (7.1%)
Income Status of Household		
Not Medicaid Enrolled	47 (9.8%)	136 (28.4%)
Medicaid Enrolled	257 (53.7%)	39 (8.1%)
Gender of Infants		
Male	177 (37.0%)	76 (15.9%)
Female	127 (26.5%)	99 (20.7%)

Table II Sample Demographics Continuous Variables

Variable	WIC Participants (304) Mean (Standard Deviation)	Non-WIC Participants (175) Mean (Standard Deviation)
Birth Weight (ounces)	115.0 (18.6)	118.0 (15.7)
Mothers Age (years)	24.5 (5.3)	28.4 (5.7)
Gestational Age (weeks)	38.6 (1.8)	38.6 (1.4)

In 2005, the census recorded 8,771 infants born to women between the ages of 18 and 44, in the sixteen counties of central Kentucky being examined. (Kentucky Cabinet for Health and Family Services, 2005) With a population of 8,771, confidence level of 95% and confidence interval of 4.5 a sample size of 450 was needed to perform parametric statistics. The final sample size was 479 participants.

Research Methodology

Through the National Vital Statistics System, the National Center for Health Statistics (NCHS) collects and publishes data on births, deaths, marriages, and divorces in the United States. Geographic coverage for births has been complete since 1933. The data were obtained through the Boyle County Health Department with permission from the dietitian, Julie Steber, RD, LD, CDE, CLC. The vital statistics documents are filled out voluntarily by participants prior to discharge from the hospital after giving birth to a child. These documents are then sent to the county health department and sent on to the state capitol to be entered into public record. The primary investigator had no direct contact with the participants. The participants were not randomized.

Research Procedures

De-identified data were received from the Boyle County Health Department. The primary investigator created participant numbers and IDs for each participant record. Data were coded into indicator variables for input into the statistical analysis software by demographics and variables extracted from the data set such as WIC participation, Medicaid participation, race, gender of the infant, etc.

Data analysis

Data were analyzed using parametric statistics. Chi-square tests were used to determine frequency distributions for each variable and breastfeeding initiation among this sample of central Kentucky mothers. Multiple logistic regression models were used to determine which variables were most significant predictors in the sample of central Kentucky participants' breastfeeding initiation. Chi-square tests were used to determine if

there was a significant difference between WIC and non-WIC participants' breastfeeding initiation for each categorical variable. A multiple logistic regression model was used to determine which variables were the most significant predictors in WIC and non-WIC participants' breastfeeding initiation. The first research objective sought to determine who was breastfeeding in central Kentucky by identifying factors associated with breastfeeding initiation. The second research objective looked at the factors that influenced breastfeeding initiation in the WIC versus the non-WIC participants in central Kentucky.

Chapter Four: Results

Findings

Hypothesis 1: There will be a significant difference in the selected demographic factors that influence breastfeeding initiation in some central Kentucky mothers.

Objective 1: Identify demographic factors that influence breastfeeding initiation.

Education level of the mother

Figure 1.1 Education Level of All Mothers in the Study

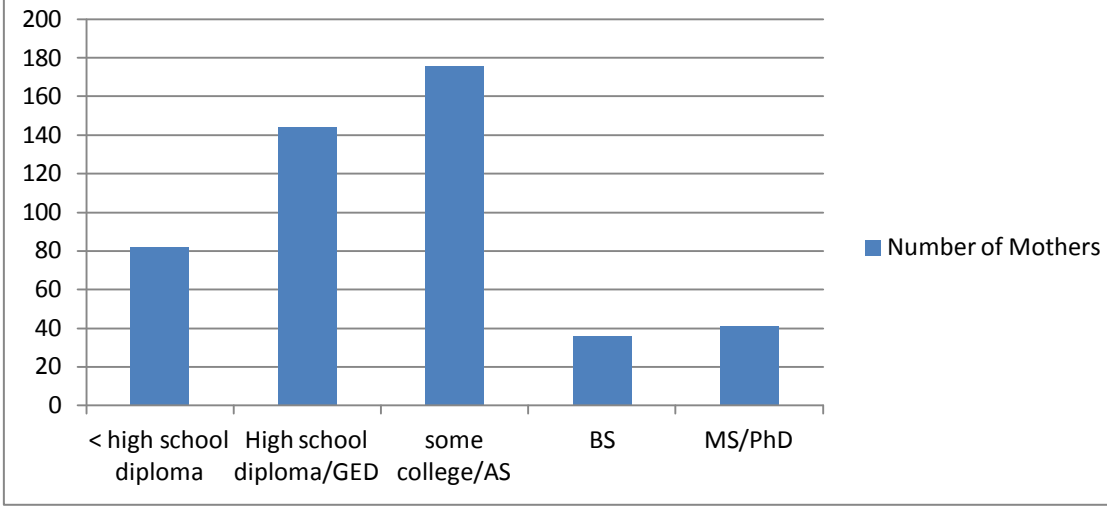


Table 1.1 Education Level of Mother and Breastfeeding

Education Level of Mother	Non-Breastfeeding	Breastfeeding
Less than High School Degree, High School Degree, or GED	145 (64.2%)	81 (16.9%)
Some College, AS, BS, MS, PhD	112 (44.3%)	141 (55.7%)

Among the 479 participants in this study, education level of the mother was a significant factor (p=0.0001) in whether she initiated breastfeeding. Mothers with some college or a college degree were more likely to breastfeed than mothers with less than or equal to a high school diploma or GED. For mothers who had less than or equal to a high school degree or a GED, 16.9% initiated breastfeeding. In the same category of mothers, 64.1% did not initiate breastfeeding. Among the mothers who had some college or a college degree, 55.7% initiated breastfeeding while 44.3% did not breastfeed.

Age of the mother

Figure 1.2 Frequency Distribution of Mother's Age

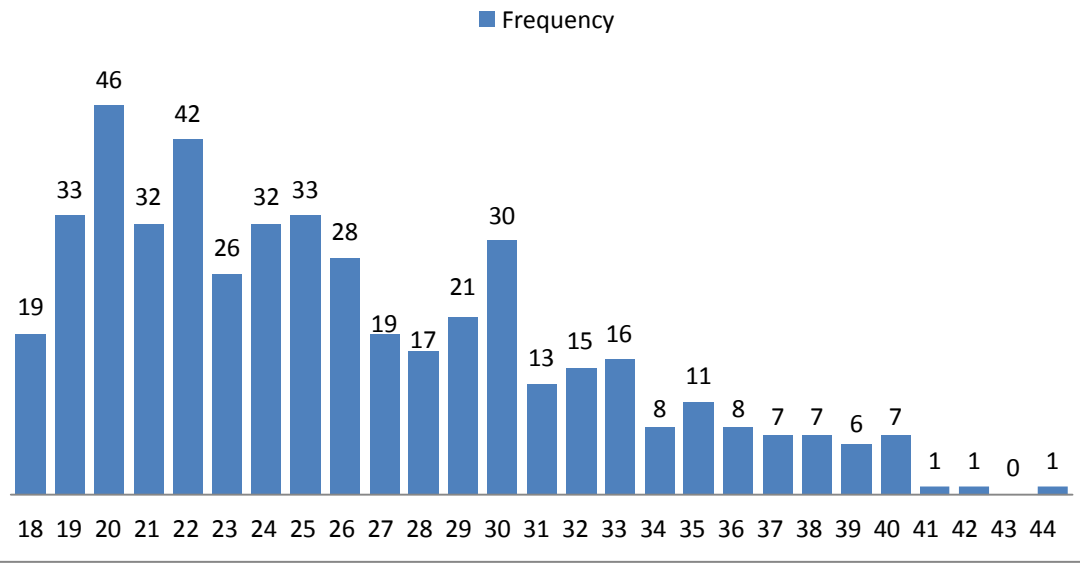


Table 1.2 Age of the Mother and Breastfeeding

Age of the Mother	Non-Breastfeeding	Breastfeeding
18-23 years old	115 (58.1%)	83 (41.9%)
24-29 years old	80 (53.3%)	70 (46.7%)
≥ 30 years old	62 (47.3%)	69 (52.7%)

Among participants, age of the mother at delivery was not a significant factor (p=0.1592) in whether she initiated breastfeeding. In reviewing the age of mothers who participated in the study, 41.9% of mothers aged 18 to 23 initiated breastfeeding while 58.1% did not breastfeed. Of those who were 24 to 29 years old, 46.7% of the mothers initiated breastfeeding and 53.3% did not breastfeed. In those participants who were 30 years or older, 52.7% initiated breastfeeding and 47.3% did not breastfeed.

Ethnicity of the mother

Figure 1.3 Frequency Distribution of Ethnicity of the Mother

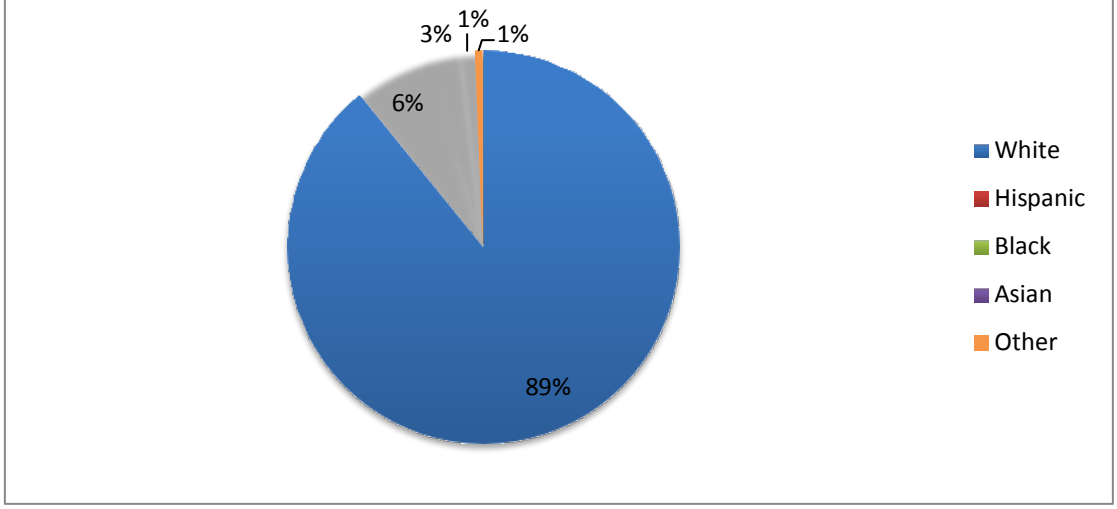


Table 1.3 Ethnicity of the Mother and Breastfeeding

Ethnicity of the Mother	Non-Breastfeeding	Breastfeeding
White	239 (56%)	188 (44%)
Non-White	18 (34.6%)	34 (65.4%)

Among participants in this study, ethnicity was a significant factor (p=0.0035) in whether a mother initiated breastfeeding. Non-white women breastfed at a higher percentage than white participants. Of the 427 white participants in the sample, 44% initiated breastfeeding and 56% were not breastfeeding. The non-white sample, which included Hispanic, Black, Asian and other ethnicities, consisted of 52 participants total. Of these 52 non-white participants, 65.4% initiated breastfeeding and 34.6% did not initiate breastfeeding.

Marital status of the mother

Figure 1.4 Frequency Distribution of Marital Status

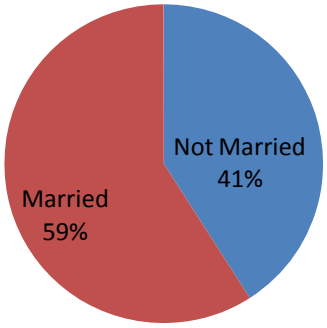


Table 1.4 Marital Status and Breastfeeding

Marital Status	Non-Breastfeeding	Breastfeeding
Not Married	121 (61.7%)	75 (38.3%)
Married	136 (48.1%)	147 (51.9%)

Among participants, marital status was a significant factor (p=0.0032) in whether a mother initiated breastfeeding with married mothers being more likely to breastfeed than mothers who were not married. In the study, 59% of participants were married and

41% were not married. Among participants who were not married, 38.3% initiated breastfeeding and 61.7% did not initiate breastfeeding. Of participants who were married, 51.94% initiated breastfeeding and 48.1% did not initiate breastfeeding.

Income status of household

Figure 1.5 Frequency Distribution of Income Status of Household

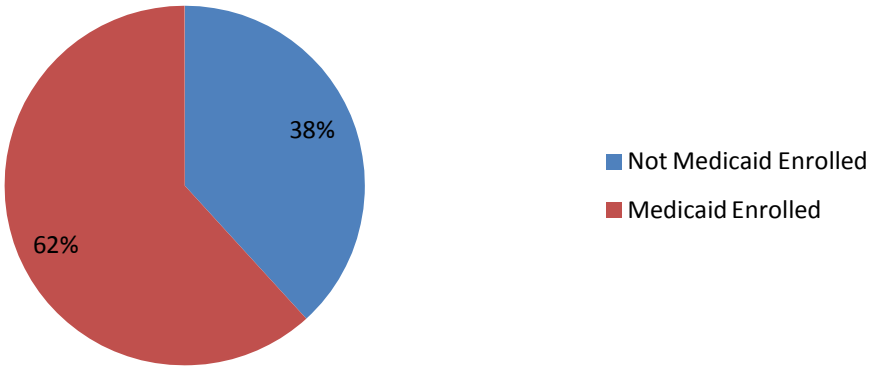


Table 1.5 Income Status of Household and Breastfeeding

Income Status of Household	Non-Breastfeeding	Breastfeeding
Not Medicaid Enrolled	68 (37.2%)	115 (62.8%)
Medicaid Enrolled	189 (63.9%)	107 (36.2%)

Medicaid enrollment was used as a qualifying determinant for household income status. Typically lower income families are more likely to be enrolled in Medicaid than higher income families. The Affordable Care Act of 2010 created a national Medicaid minimum eligibility level of 133% of the federal poverty level ($29,700 for a family of four in 2011).

Among participants, income status of the household was a significant factor ($p<0.0001$) in whether the mother initiated breastfeeding. Mothers who were enrolled in Medicaid were less likely to breastfeed than mothers who were not enrolled in Medicaid. In the sample population of 479 participants, 296 participants were enrolled in Medicaid and 183 participants were not enrolled in Medicaid. Of those not enrolled in Medicaid, 62.8% initiated breastfeeding and 37.2% did not initiate breastfeeding. Of mothers enrolled in Medicaid, 36.2% initiated breastfeeding while 63.9% did not initiate breastfeeding.

Gender of the infant

Figure 1.6 Frequency Distribution of the Gender of the Infant

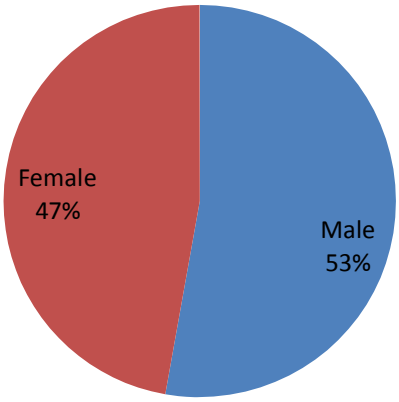


Table 1.6 Gender of the Infant and Breastfeeding

Gender of the Infant	Non-Breastfeeding	Breastfeeding
Male	142 (56.1%)	111 (43.9%)
Female	115 (50.9%)	111 (49.1%)

Among participants in this study, gender of the infant was not a significant factor (p=0.2508) in whether the mother initiated breastfeeding. Of participants, 53% had male infants and 47% had female infants. Among those who had male infants, 43.9% initiated breastfeeding and 56.1% did not initiate breastfeeding. Of female infants born, 49.1% were breastfed and 50.9% were not breastfed.

Birth weight of the infant

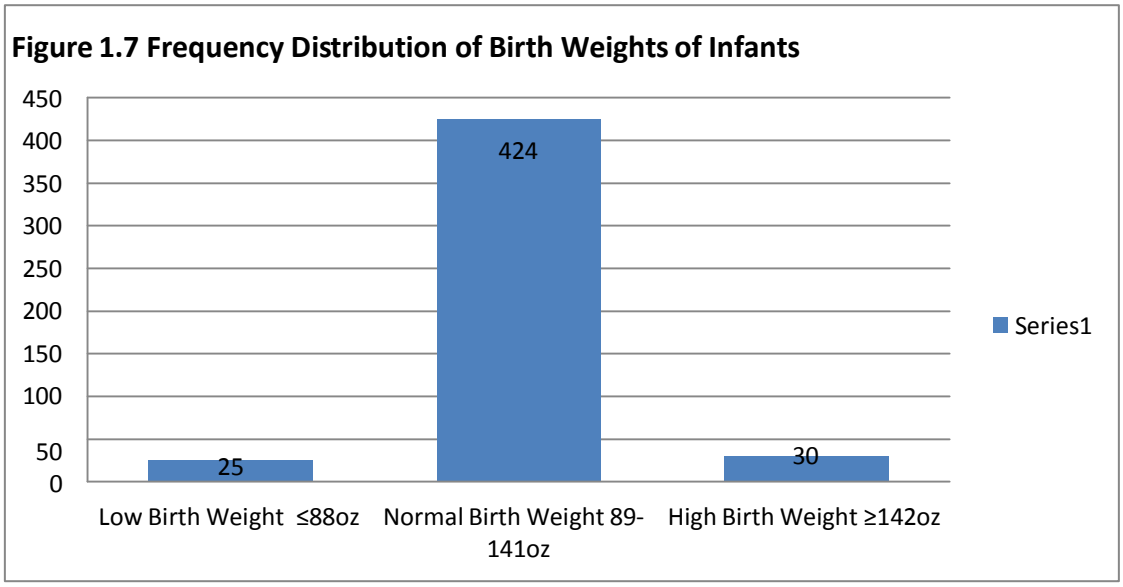


Table 1.7 Birth Weight of Infant and Breastfeeding

Birth Weight of Infant	Non-Breastfeeding	Breastfeeding
Low Birth Weight ≤88oz	17 (68%)	8 (32%)
Normal Birth Weight 89-141oz	222 (52.4%)	202 (47.6%)
High Birth Weight ≥142oz	18 (60%)	12 (40%)

Low birth weight (LBW) is defined by the World Health Organization (WHO) as weight at birth of less than 2500 grams (less than or equal to 88 ounces). Normal birth weight status is defined by the WHO guidelines as an infant weighing between 2500 grams and 4000 grams (89-141 ounces) at birth. High birth weight or macrosomia is

defined by the WHO guidelines as an infant weighing greater than 4000 grams (greater than or equal to 142 ounces) at birth.

Among participants in this study, birth weight of the infant was not a significant factor (p=0.2416) in whether the mother initiated breastfeeding. Breastfeeding initiation was highest among mothers of normal birth weight infants. In the sample, 88.5% of infants were normal birth weight, 6.3% were high birth weight, and 5.2% were low birth weight. Of the participants who gave birth to low birth weight infants, 32% (n=8) initiated breastfeeding and 68% (n=17) did not breastfeed. Of the normal birth weight infants, 47.6% (n=202) of mothers initiated breastfeeding and 52.4% (n=222) did not initiate breastfeeding. Of the high birth weight infants, 40% (n=12) initiated breastfeeding and 60% (n=18) did not initiate breastfeeding.

Gestational age of the infant

Figure 1.8 Frequency Distribution of Gestational Age of Infants

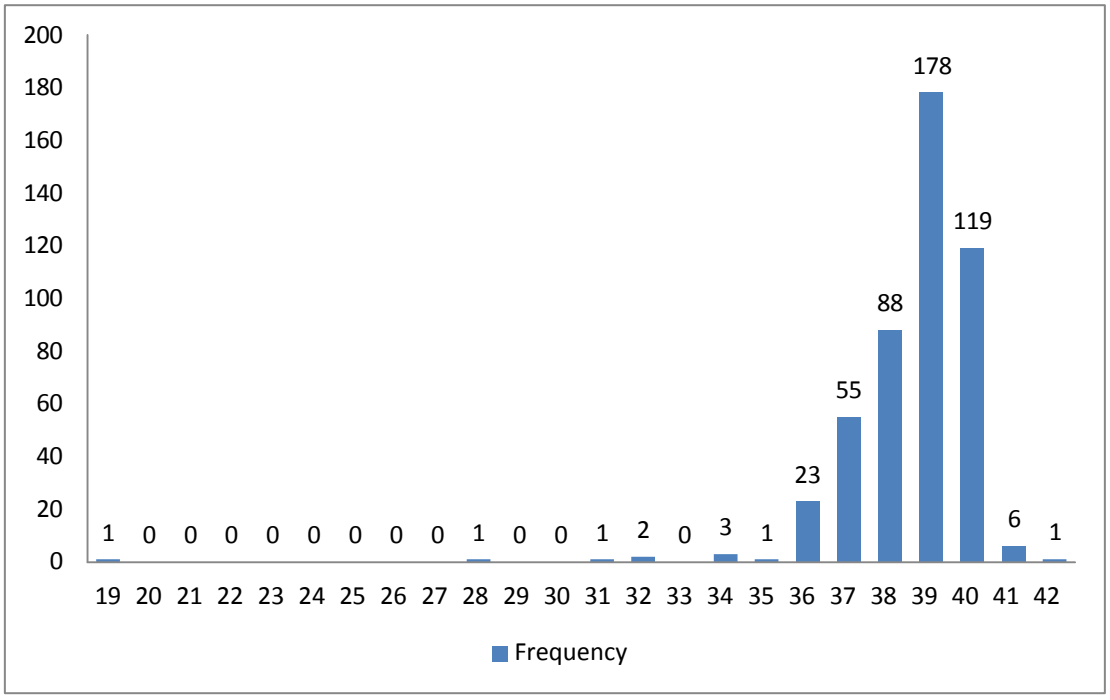


Table 1.8 Gestational Age of Infant and Breastfeeding

Gestational Age of Infant	Non-Breastfeeding	Breastfeeding
≤ 37 weeks	55 (63.2%)	32 (36.8%)
>37 weeks	202 (51.5%)	190 (48.5%)

Among participants, gestational age of the infant was a significant factor (p=0.0480) in whether the mother initiated breastfeeding. According to the World Health Organization, a preterm infant is defined as an infant born alive before 37 weeks of pregnancy have been completed. Mothers whose infants were born later than 37 weeks gestation were more likely to breastfeed than those who carried their infants to 37 weeks gestation or less. Of those born at less than or equal to 37 weeks, 36.8% were breastfed and 63.2% were not breastfed. Of those born at greater than 37 weeks, 48.5% were breastfed and 51.5% were not breastfed.

Logistic Regression for Breastfeeding and Significant Variables

When running the logistic regression for the significant variables from objective number one, all 479 observations were used in the Fisher's scoring optimization technique to create the binary logit model. The cleaned data were used in the statistical calculations using the SAS 9.3 software. Seven observations were removed due to incomplete data and 19 observations were removed due to the mother's age being less than 18 years. The response variable was breastfeeding, which was expressed as zero for non-breastfeeding and one for breastfeeding. There were 257 observations with non-breastfeeding and 222 observations with breastfeeding for the response variable. The probability modeled is breastfeeding (BF) equals one. For the global null hypothesis beta

equals zero, the likelihood ratio Chi-Square was 52.7803 with five degrees of freedom. A p-value of less than 0.0001 indicated that the model was statistically significant.

In table 1.9.1, Analysis of Maximum Likelihood Estimates, we see the degrees of freedom, coefficients, their standard errors, the Wald chi-square test and associated p-values. Both education (p=0.0033), ethnicity (p=0.0014), and income status (p=0.0003) were statistically significant; gestational age (p=0.1358) and marital status (p=0.4972) were not.

For the variable of education, the observation was a one unit increase in education level (i.e., going from 0 to 1), thus the expression was a 0.6220 increase in the log odds of being in a higher level of breastfeeding, given all of the other variables in the model are held constant. In other words, there is an increase in breastfeeding when education level of the mother increases.

For ethnicity, the observation was a unit increase in ethnicity (i.e., going from white to non-white), the expression shows 1.0446 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant. There is an increase in breastfeeding percentage among the non white participants compared to the white participants.

For marital status, the observation was a unit increase in marital status (i.e., going from not married to married), the expression shows 0.1458 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant. There was an increase in breastfeeding in those who were married versus those who are not married.

For household income status, the observation was a unit increase in household income (i.e., going from not Medicaid enrolled to Medicaid enrolled), the expression shows 0.8015 decrease in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant. The odds of breastfeeding decrease if the mother is enrolled in Medicaid.

For gestational age, the observation was a unit increase in gestational age (i.e., going from infant born at 37 weeks to >37 weeks gestational age), the expression shows 0.3845 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant. With increased gestational age of the infant there was a greater rate of breastfeeding.

In table 1.9.2 the results presented as proportional odds ratios (the coefficient exponentiated) and the 95% confidence intervals for the proportional odds ratios. For education, an increase in education level the odds of breastfeeding were 1.863 greater. For ethnicity, a change in ethnicity from white to non-white the odds of breastfeeding were 2.842 greater. For marital status, an increase in marital status from not married to married the odds of breastfeeding were 1.157 greater. For household income status, an increase in income status the odds of breastfeeding were 0.449 greater. For gestational age, an increase in gestational age the odds of breastfeeding were 0.449 greater.

Table 1.9-1 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.5055	0.3509	2.0760	0.1496
education	1	0.6220	0.2119	8.6186	0.0033
ethnicity	1	1.0446	0.3263	10.2461	0.0014
married	1	0.1458	0.2148	0.4609	0.4972
Medicaid	1	-0.8015	0.2230	12.9212	0.0003
Gestation age	1	0.3845	0.2578	2.2254	0.1358

Table 1.9-2 Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
education	1.863	1.230	2.821
ethnicity	2.842	1.499	5.388
married	1.157	0.759	1.762
Medicaid	0.449	0.290	0.695
Gestation age	1.469	0.886	2.435

Hypothesis 2: There will be a significant difference in the proportion of WIC versus non-WIC participants who breastfeed in the central Kentucky region.

Objective 2: Examine the proportion of mothers in the WIC versus Non-WIC population who breastfeed.

WIC participation related to breastfeeding

Figure 2.1 Frequency Distribution of WIC Versus Non-WIC

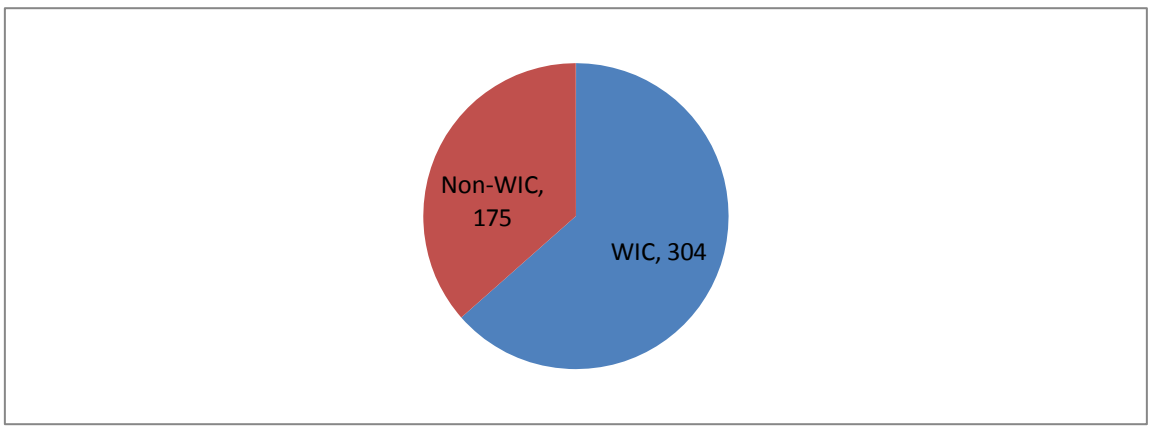


Table 2.1 WIC Participation and Breastfeeding

WIC Participation	Non Breastfeeding	Breastfeeding
WIC	191 (62.8%)	113 (37.2%)
Non-WIC	66 (37.7%)	109 (62.3%)

WIC participation was a significant factor ($p>0.0001$) in whether a participant in this study will initiate breastfeeding. A mother who participated in WIC was less likely to initiate breastfeeding whereas mothers who were not in WIC were more likely to breastfeed. Among the WIC participants in this study, 62.8% did not initiate breastfeeding and 37.2% initiated breastfeeding. Of the non-WIC participants in this study, 37.7% did not initiate breastfeeding and 62.3% initiated breastfeeding.

Education level of the mother

Table 2.2-1 Educational Level and Breastfeeding in the WIC Participants

Education Level of WIC Mother	Non-Breastfeeding	Breastfeeding
Less than High School Degree, High School Degree, or GED	125 (64.8%)	68 (35.2%)
Some College, AS, BS, MS, PhD	66 (59.5%)	45 (40.5%)

Among the WIC participants, Education level of the mother was not a significant factor ($p=0.3566$) in whether a mother initiated breastfeeding. Among the 304 WIC participants in this study, 193 mothers had less than or equal to a high school degree or GED and 111 had some college or a college degree. Of the WIC participants with less than or equal to a high school degree or GED, 64.8% did not initiate breastfeeding while 35.2% initiated breastfeeding. Of WIC participants who had some college or a college degree, 59.5% did not breastfeed and 40.54% initiated breastfeeding.

Table 2.2-2 Educational Level and Breastfeeding in the Non-WIC Participants

Education Level of Non-WIC Mother	Non-Breastfeeding	Breastfeeding
Less than High School Degree, High School Degree, or GED	20 (60.6%)	13 (39.4%)
Some College, AS, BS, MS, PhD	46 (32.4%)	96 (67.6%)

In the non-WIC population, education level of the mother was a significant factor (p=0.0026) in whether a mother initiated breastfeeding. Mothers who were more educated breastfed more than those with less education. Of the 175 non-WIC participants in this study, 33 mothers had less than or equal to a high school degree or GED and 142 mothers had some college or a college degree. Of the non-WIC participants who had less than or equal to a high school degree or GED, 60.6% (n=20) did not initiate breastfeeding and 39.4% (n=13) initiated breastfeeding. Of mothers in this study who were not enrolled in WIC and had some college or a college degree, 32.4% (n=46) did not initiate breastfeeding and 67.6% (n=96) initiated breastfeeding.

Age of the mother

Table 2.3-1 Age of Mother and Breastfeeding in the WIC Participants

Age of Mother WIC	Non-Breastfeeding	Breastfeeding
18-23 years old	96 (61.1%)	61 (38.9%)
24-29 years old	60 (67.4%)	29 (32.6%)
≥30 years old	35 (60.3%)	23 (39.7%)

In the WIC participants, age of the mother was not a significant factor (p=0.5640) in whether she initiated breastfeeding. In reviewing the 304 WIC participants from this study, 157 were between 18 and 23 years old, 89 were between 24 and 29 years old, and

58 were 30 years or older when they gave birth. Of the WIC participants in this study who were between the ages of 18 and 23, 61.1% did not initiate breastfeeding and 38.9% mothers initiated breastfeeding. Of WIC mothers who were 24 to 29 years old, 67.4% did not initiate breastfeeding and 32.6% initiated breastfeeding. In the 30 plus age group of WIC mothers, 60.3% did not initiate breastfeeding and 39.7% initiated breastfeeding.

Table 2.3-2 Age of Mother and Breastfeeding in the Non-WIC Participants

Age of Mother Non-WIC	Non-Breastfeeding	Breastfeeding
18-23 years old	19 (46.3%)	22 (53.7%)
24-29 years old	20 (32.8%)	41 (67.2%)
≥30 years old	27 (37%)	46 (63%)

In the non-WIC participants, age of the mother was not a significant factor ($p=0.3779$) in whether she initiated breastfeeding. Examining the 175 mothers who were non-WIC participants, 41 were between 18 and 23 years old, 61 were between 24 and 29 years old, and 73 were 30 years or older. Of the non-WIC participants aged 18-23 years , 46.3% (n=19) did not initiate breastfeeding and 53.7% (n=22) initiated breastfeeding. Of non-WIC participants aged 24-29 years old, 32.8% (n=20) did not initiate breastfeeding and 67.2% (n=41) initiated breastfeeding. Among the Non-WIC mothers in the 30 plus age group, 37% (n=27) did not initiate breastfeeding and 63% (n=46) initiated breastfeeding.

Ethnicity of the mother

Table 2.4-1 Ethnicity of the Mother and Breastfeeding in the WIC Participants

Ethnicity of the WIC Mother	Non-Breastfeeding	Breastfeeding
White	176 (66.9%)	87 (33.1%)
Non-White	15 (36.6%)	26 (63.4%)

In the WIC population, ethnicity of the mother was a significant factor in whether a mother initiated breastfeeding (p=0.0002). WIC participants of non-white ethnicity were more likely to breastfeed than those of white ethnicity. Of the 304 WIC participants, 263 were White and 41 were Non-White including participants of Hispanic, Black, Asian and other ethnicities. Among the WIC mothers of White ethnicity, 66.9% (n=176) of mothers did not initiate breastfeeding and 33.1% (n=87) initiated breastfeeding. Of the 41 Non-White WIC participants, 36.6% (n=15) did not initiate breastfeeding and 63.4% (n=26) initiated breastfeeding.

Table 2.4-2 Ethnicity of the Mother and Breastfeeding in the Non-WIC Participants

Ethnicity of the Non-WIC Mother	Non-Breastfeeding	Breastfeeding
White	63 (38.4%)	101 (61.6%)
Non-White	3 (27.3%)	8 (72.7%)
Note: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.		

Ethnicity of the mother was not a significant factor in whether a mother initiated breastfeeding in the non-WIC population (p=0.4605). However, due to the small sample in the Non-White category the Chi-Square test may not have been a valid indicator.

There were 175 non-WIC participants in this study; 164 in the white category and 11 in the non-white category. Of the non-WIC participants of white ethnicity, 38.4% (n=63) did not initiate breastfeeding and 61.6% (n=101) initiated breastfeeding. Of the 11 mothers who were of Non-White ethnicity and were not enrolled in WIC, 27.3% (n=3) did not initiate breastfeeding and 72.7% (n=8) initiated breastfeeding.

Marital status of the mother

Table 2.5-1 Marital Status of the Mother and Breastfeeding in the WIC Participants

Marital Status of WIC Mothers	Non-Breastfeeding	Breastfeeding
Not Married	108 (66.7%)	54 (33.3%)
Married	83 (58.5%)	59 (41.5%)

In the WIC population, marital status of the mother was a not significant factor (p=0.1392) in whether a mother initiated breastfeeding. There were 162 WIC participants who were not married, of which 66.7% did not initiate breastfeeding and 33.3% initiated breastfeeding. Of the 142 WIC participants who were married, 58.5% did not initiate breastfeeding and 41.5% initiated breastfeeding.

Table 2.5-2 Marital Status of the Mother and Breastfeeding in the Non-WIC Participants

Marital Status of Non-WIC Mothers	Non-Breastfeeding	Breastfeeding
Not Married	13 (38.2%)	21 (61.8%)
Married	53 (37.6%)	88 (62.4%)

In the non-WIC participants, marital status of the mother was not a significant factor (p=0.9443) in whether a mother initiated breastfeeding. However 80.6% of Non-WIC participants, were married whereas 46.7% of the WIC participants were married. There were 34 non-WIC participants who were not married, of which 38.2% (n=13) did

not initiate breastfeeding and 61.8% (n=21) initiated breastfeeding. Of the 141 non-WIC participants who were married, 37.6% (n=53) did not initiate breastfeeding and 62.4% initiated breastfeeding.

Income status of household

Table 2.6-1 Income Status of the Household and Breastfeeding in the WIC Participants

Income Status of Household in WIC participants	Non-Breastfeeding	Breastfeeding
Not Medicaid Enrolled	26 (55.3%)	21 (44.7%)
Medicaid Enrolled	165 (64.2%)	92 (35.8%)

As previously described in the literature review on the History of WIC, WIC guidelines allow mothers with a household income at 185% of the federal poverty level to enroll. Medicaid guidelines allow individuals with a household income at 133% of the federal poverty level to enroll. Therefore not all WIC participants are eligible to enroll in Medicaid. Of those enrolled in WIC, 84.5% were enrolled in Medicaid and 15.5% were not enrolled in Medicaid.

In the WIC population, income status of the household was not a significant factor (p=0.2466) in breastfeeding initiation. Of those WIC households not enrolled in Medicaid, 55.3% did not initiate breastfeeding and 44.7% initiated breastfeeding. Of the WIC participants enrolled in Medicaid, 64.2% did not initiate breastfeeding and 35.8% initiated breastfeeding.

Table 2.6-2 Income Status of the Household and Breastfeeding in the Non-WIC Participants

Income Status of Household in Non-WIC participants	Non-Breastfeeding	Breastfeeding
Not Medicaid Enrolled	42 (30.9%)	94 (69.1%)
Medicaid Enrolled	24 (61.5%)	15 (38.5%)

In the non-WIC population, income status of the household was a significant factor (p=0.0005) in breastfeeding initiation. Non-WIC participants with higher income are more likely to breastfeed than those with lower income. Of the non-WIC participants, 22.3% were defined as low income due to their participation in Medicaid. These mothers would have low income status but do not meet the nutritional risk component of WIC eligibility. Of the non-WIC participants not enrolled in Medicaid, 30.8% did not initiate breastfeeding and 69.1% initiated breastfeeding. In the low income status non-WIC participants 61.5% did not initiate breastfeeding and 38.5% initiated breastfeeding.

Gender of the infant

Table 2.7-1 Gender of the Infant and Breastfeeding in the WIC Participants

Gender of the Infant WIC	Non-Breastfeeding	Breastfeeding
Male	112 (63.3%)	65(36.7%)
Female	79(62.2%)	48(37.8%)

Among WIC participants, the gender of the infant was not a significant factor (p=0.8487) in the determination of breastfeeding initiation. Out of the 304 WIC mothers who participated in this study, 177 had males and 127 had female infants. Of WIC

mothers who had male infants, 63.3% did not initiate breastfeeding and 36.7% initiated breastfeeding. Of female infants born to WIC mothers, 62.2% were not breastfed and 37.8% were breastfed.

Table 2.7-2 Gender of the Infant and Breastfeeding in the Non-WIC Participants

Gender of the Infant Non-WIC	Non-Breastfeeding	Breastfeeding
Male	30 (39.5%)	46 (60.5%)
Female	36 (36.4%)	63 (63.6%)

In the Non-WIC participants, the gender of the infant was not significant (p=0.6739) in the determination of breastfeeding initiation. Out of the 175 Non-WIC participants in this study, 76 had males and 99 had female infants. Of the participants not enrolled in WIC who had male infants, 39.5% did not initiate breastfeeding and 60.5% initiated breastfeeding. Of the mothers not enrolled in WIC who had female infants, 36.4% did not initiate breastfeeding and 63.6% initiated breastfeeding.

Birth weight of the infant

Table 2.8-1 Birth Weight of the Infant and Breastfeeding in the WIC Participants

Birth Weight of Infant WIC	Non-Breastfeeding	Breastfeeding
Low Birth Weight ≤88oz	14 (73.7%)	5 (26.3%)
Normal Birth Weight 89-141oz	163 (61.3%)	103 (38.7%)
High Birth Weight ≥142oz	14 (73.7%)	5 (26.3%)

Among the WIC population, the birth weight of the infant was not a significant factor (p=0.3343) in the determination of breastfeeding initiation. Of the 304 WIC participants, 19 infants were low birth weight (LBW) status, 266 infants were normal birth weight status and 19 were high birth weight status. For the WIC mothers with LBW infants, 73.7% (n=14) did not initiate breastfeeding and 26.3% (n=5) initiated

breastfeeding. Of the mothers enrolled in WIC who had a normal birth weight infant, 61.3% (n=163) did not initiate breastfeeding and 38.7% (n=103) initiated breastfeeding. In WIC mothers with high birth weight status infants, 73.7% (n=14) did not breastfeed and 26.3% (n=5) initiated breastfeeding.

Table 2.8-2 Birth Weight of the Infant and Breastfeeding in the Non-WIC Participants

Birth Weight of Infant Non-WIC	Non-Breastfeeding	Breastfeeding
Low Birth Weight ≤88oz	3 (50%)	3 (50%)
Normal Birth Weight 89-141oz	59 (37.3%)	99 (62.7%)
High Birth Weight ≥142oz	4 (36.4%)	7 (63.6%)
Note: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.		

Among the non-WIC population, birth weight of the infant was not a significant factor (p=0.8173) in the determination of breastfeeding initiation. More high birth weight infants were breastfed by percent than those of normal or low birth weight. Of the 175 non-WIC participants, six infants were LBW status, 158 were normal birth weight status, and 11 were high birth weight status. Among non-WIC mothers with LBW infants, 50% (n=3) were not breastfed and 50% (n=3) were breastfed. Of mothers not enrolled in WIC who had normal birth weight infants, 37.3% (n=59) did not initiate breastfeeding and 62.7% (n=99) initiated breastfeeding. Of mothers not enrolled in WIC who had high birth weight infants, 36.4% (n=4) were not breastfed and 63.6% (n=7) were breastfed. Due to the small sample size of low and high birth weight infants in the non-WIC population the Chi-Square test may not be a reliable indicator of significance.

Gestational age of the infant

Table 2.9-1 Gestational Age of the Infant and Breastfeeding in the WIC Participants

Gestational Age of the Infant WIC	Non-Breastfeeding	Breastfeeding
≤37weeks	45 (76.3%)	14 (23.7%)
>37 weeks	146 (59.6%)	99 (40.4%)

In the WIC population, gestational age of the infant was a significant factor(p=0.0173) in breastfeeding initiation. WIC participants with infants born later than 37 weeks are more likely to breastfeed than those with infants born earlier. Of the 304 WIC participants in this study, 59 were born at or before 37 weeks gestation and 245 were born at later than 37 weeks. Among the WIC participants with infants born at or before 37 weeks, 76.3% were not breastfed and 23.7% were breastfed. Of those infants who were born later than 37 weeks gestation and were enrolled in WIC, 59.6% were not breastfed and 40.4% were breastfed.

Table 2.9-2 Gestational Age of the Infant and Breastfeeding in the Non-WIC Participants

Gestational Age of the Infant Non-WIC	Non-Breastfeeding	Breastfeeding
≤37weeks	10 (35.7%)	18 (64.3%)
>37 weeks	56 (38.1%)	91 (61.9%)

In the non-WIC population, gestational age was not a significant factor (p=0.8117) in the initiation of breastfeeding. Of the 175 non-WIC participants in this study, 28 were born at or before 37 weeks gestation and 147 were born later than 37 weeks gestation. Of the infants who were not enrolled in WIC and were born at or before

37 weeks gestation 35.7% (n=10) were not breastfed and 64.3% (n=18) were breastfed. Among the infants not enrolled in WIC who were born later than 37 weeks gestation, 38.1% (n=56) were not breastfed and 61.9% (n=91) were breastfed.

Logistic Regression in the WIC Population

When running the logistic regression for the significant variables from objective two for the WIC participants, 304 observations were used in the Fisher's scoring optimization technique to create the binary logit model. A subset rule was used in the SAS program to create a data set of only observations with WIC equaling one. The response variable was breastfeeding expressed as zero for non-breastfeeding and one for breastfeeding. There were 191 observations with non-breastfeeding and 113 observations with breastfeeding for the response variable. The probability modeled is breastfeeding (BF) equals one. In the global null hypothesis beta equals zero, the likelihood ratio Chi-Square was 18.8314 with two degrees of freedom. A p-value of less than 0.0001 indicated that the model as statistically significant.

In table 2.10-1 Analysis of Maximum Likelihood Estimates, the degrees of freedom, coefficients, their standard errors, the Wald chi-square test and associated p-values were observed. Both ethnicity (p=0.0005), and gestational age (p=0.0260) were statistically significant.

For ethnicity, the observation was for a one unit increase in ethnicity (i.e., going from white to non-white), the expectation was a 1.2371 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given

that all of the other variables in the model are held constant. There is an increase in breastfeeding in the non-white WIC participants compared to those of white ethnicity.

For gestational age, the observation was for a one unit increase in gestational age (i.e., going from 37 weeks to >37 weeks), the expectation was a 0.7549 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant. There is an increase in breastfeeding as the gestational age exceeds 37 weeks.

In table 2.10-2, the results presented as proportional odds ratios (the coefficient exponentiated) and the 95% confidence intervals for the proportional odds ratios. For ethnicity, the odds of breastfeeding were 3.446 greater for non-white than white. For gestational age, the odds of the mother initiating breastfeeding were 2.128 greater for infants born at >37 weeks than 37 weeks.

Table 2.10-1 Analysis of Maximum Likelihood Estimates in the WIC Participants

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-1.3248	0.3159	17.5832	<.0001
ethnicity	1	1.2371	0.3529	12.2902	0.0005
Gestation age	1	0.7549	0.3390	4.9586	0.0260

Table 2.10-2 Odds Ratio Estimates in the WIC Participants

Effect	Point Estimate	95% Wald Confidence Limits	
Ethnicity	3.446	1.725	6.881
Gestation age	2.128	1.095	4.135

Logistic Regression in the Non-WIC Population

When running the logistic procedure for the significant variables from objective two for the non-WIC participants, 175 observations were used in the Fisher's scoring optimization technique to create the binary logit model. A subset rule was used in the SAS program to create a data set of only observations with WIC equaling zero. The response variable was breastfeeding expressed as zero for non-breastfeeding and one for breastfeeding. There were 66 observations with non-breastfeeding and 109 observations with breastfeeding for the response variable. The probability modeled was breastfeeding (BF) equals one. In the global null hypothesis beta equals zero, the likelihood ratio Chi-Square was 15.7024 with two degrees of freedom. A p-value of 0.0004 indicated that the model is statistically significant.

In table 2.10-3, Analysis of Maximum Likelihood Estimates, observations include the degrees of freedom, coefficients, their standard errors, the Wald chi-square test and associated p-values. Both education level (p=0.0487), and income status (p=0.0089) were statistically significant.

For education level, for a one unit increase in education level (i.e., going from 0 to 1), the observation was a 0.0487 increase in the log odds of being in a higher level of breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant.

For income status, for a one unit increase in income status (i.e., going from 0 to 1), the observation was a 0.3980 increase in the log odds of being in a higher level of

breastfeeding (going from non-breastfeeding to breastfeeding), given that all of the other variables in the model are held constant

In table 2.10-4, the results presented as proportional odds ratios (the coefficient exponentiated) and the 95% confidence intervals for the proportional odds ratios. For education level, the odds of breastfeeding were 2.312 greater for an increase from 0 to 1. For income status, the odds of breastfeeding were 0.353 greater for an increase from 0 to 1.

Table 2.10-3 Analysis of Maximum Likelihood Estimates in the Non-WIC Participants

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	0.0770	0.4108	0.0351	0.8514
Education	1	0.8383	0.0487	3.8867	0.0487
Medicaid	1	-1.0413	0.3980	6.8445	0.0089

Table 2.10-4 Odds Ratio Estimates in the Non-WIC Participants

Effect	Point Estimate	95% Wald Confidence Limits	
Education	2.312	1.005	5.321
Medicaid	0.353	0.162	0.770

Summary

When looking at the sample as a whole in objective one, the education, ethnicity and marital status of the mother, income status of the household, and gestational age of the infant were all significant factors in the initiation of breastfeeding.

The breakdown of the population into the WIC versus Non-WIC population in objective two shows differences in which variables were significant. Overall WIC was a significant factor in the initiation of breastfeeding. Among the WIC participants ethnicity of the mother and gestational age of the infant were significant factors in initiating

breastfeeding. In the Non-WIC participants, education level of the mother and household income status were significant factors in initiating breastfeeding. In the Non-WIC participants there may not have been enough data to draw a valid Chi-square test for ethnicity of the mother and birth weight of the infant.

Table 3.1 Objective 1 Variable Significance

Variable	Significance
Education Level of the Mother	p<0.0001*
Age of Mother	p=0.1592
Ethnicity of the Mother	p=0.0035*
Marital Status of the Mother	p=0.0032*
Income Status of the Household	p<0.0001*
Gender of the Infant	p=0.2508
Birth Weight of the Infant	p=0.2416
Gestational Age of the Infant	p=0.0480*
* Significant variable	

Table 3.2 Objective 2 Variable Significance

Variable	Significance WIC	Significance Non-WIC
WIC Participation	p<0.0001*	
Education Level of the Mother	p=0.3566	p=0.0026*
Age of Mother	p=0.5640	p=0.3779
Ethnicity of the Mother	p=0.0002*	p=0.4605
Marital Status of the Mother	p=0.1392	p=0.9443
Income Status of the Household	p=0.2466	p=0.0005*
Gender of the Infant	p=0.8487	p=0.6739
Birth Weight of the Infant	p=0.3343	p=0.8173
Gestational Age of the Infant	p=0.0173*	p=0.8117
* Significant variable		

Chapter Five: Discussion

Hypothesis one that there will be a significant difference in the factors that influence breastfeeding initiation was accepted. When looking at the sample as a whole in objective one it was found that the education, ethnicity, and marital status of the mother, income status of the household, and gestational age of the infant were all significant factors in the initiation of breastfeeding.

Education level was a significant factor in the initiation of breastfeeding according to the results of this study. Mothers with greater than a high school degree are more likely to breastfeed than mothers with less than or equal to a high school degree. These findings are in accordance with research analyzing census data which found that less educated mothers are less likely to breastfeed than more educated mothers, with initiation rates increasing from 55.1 to 81.2% with increased education level. (Wenjun, Acosta, 2002)

Although the age of the mother was not a significant factor there was an increase in the percentage of mothers who breastfed as the age of the mother increased. In the age range of 18-23, 41.92% of mothers breastfed; whereas, in the age range of 30 plus, 52.67% of mothers breastfed. If data from mothers younger than 18 had been included in the study, the percentage of breastfeeding in that population may have been lower than the 18 to 23 age range similar to other research that was able to capture that population. Parity may also play into these results because mothers who have had more than one child may see more benefit in breastfeeding. The data in this study did not capture this information for the sample population.

According to the data sample, non-white mothers were more likely to initiate breastfeeding than white mothers, which are different findings from other research done on breastfeeding. The much smaller sample size of the non-white population may have played a role in these results as well as the Hispanic population captured in this study. Of the non-white participants, 57.7% were of Hispanic ethnicity. In CDC data the breastfeeding initiation rate for the Hispanic or Latino population was 80.6%, but for the non-Hispanic black or African American population, it was 58.1%. (CDC, 2012) There were not enough non-white participants in the study to analyze the minority ethnicities individually. There may have been different results if the Hispanic and Black ethnicities were analyzed separately.

This research found that those who are married are more likely to breastfeed than those who are not married. This is in accordance with other research done on the topic. Support from significant others has been found to contribute to breastfeeding success. Breastfeeding continuation is associated with the father's knowledge, attitude and support and also the support of the maternal grandmother according to a study on breastfeeding and health outcomes done in 2012. (Dieterich, Felice, O'Sullivan, Ramussen, 2013)

Income status of the household affected breastfeeding initiation in the sample population. Those who were not enrolled in Medicaid were significantly more likely to breastfeed than those who were enrolled in Medicaid. In this sample, Medicaid enrollment was used to determine household income status; however, there are other factors that can allow a person to be enrolled in Medicaid other than income such as disability. This could have had an impact on the results.

Slightly more female infants (49.1%) were breastfed than male infants (43.9%) in this sample; however, it was not a significant factor in the initiation of breastfeeding. Based on data from 79 countries with estimates by background information, figures show little difference in the prevalence of exclusive breastfeeding by gender. (UNICEF, 2013)

Normal birth weight infants were more likely to be breastfed than low or high birth weight infants and LBW infants are less likely to be breastfed than normal or high birth weight infants. Infants born at later than 37 weeks were more likely to be breastfed than infants born at or before 37 weeks. This may tie into the results that LBW infants had a low rate of breastfeeding. Infants born prematurely may have physical or developmental issues that do not allow for breastfeeding. The mother of premature infants may also have issues with milk production leading to exclusive or supplemental formula feeding. LBW infants are more likely to be kept in the nursery or ICU at the hospital longer possibly resulting in formula feeding by the nursing staff.

There were significant differences in WIC vs. non-WIC participants who breastfeed. Therefore hypothesis two was accepted. Non-WIC participants were significantly more likely to breastfeed than WIC participants were with 62.3% of non-WIC participants and only 37.2% of WIC participants initiating breastfeeding. Breastfeeding rates are likely impacted by the offering of formula at no cost to the participants of the WIC program. Among the WIC participants, ethnicity of the mother and gestational age of the infant were significant factors in initiating breastfeeding. In the Non-WIC participants, education level of the mother and household income status were significant factors in initiating breastfeeding.

Among the WIC participants there was not a significant impact made on breastfeeding rates by education level; however, there was an increase in breastfeeding in participants with some college or a college degree (40.5%) versus those with less than or equal to a high school degree (35.2%). In the non-WIC population there was a significant difference in breastfeeding rates between those with some college or a college degree (67.6%) versus those with less than or equal to a high school degree (39.4%).

Although age of the mother was not a significant factor in the initiating of breastfeeding in the WIC population there were some differences in the pattern from the overall data. Mothers age 24-29 were least likely to breastfeed and mothers age 30 plus were most likely to breastfeed. This differs from the non-WIC population which had the highest breastfeeding initiation in the mothers age 24-29 and least likely in those aged 18-23.

In this sample, those who were non-white were more likely to breastfeed in the WIC and non-WIC population than those who were white. These findings differ from research found on the topic of ethnicity and breastfeeding. The small sample of non-white participants may have affected these results; however, it may warrant more investigation to find out what the significant factors are in this specific population of central Kentucky.

Research shows that marital status is typically a factor in breastfeeding initiation; however this study showed marital status had no significant impact on breastfeeding in the WIC and non-WIC samples. In future research, the other forms of support should be investigated such as grandmother, boyfriend, life partner, etc. There are changing

household structures that do not always get captured in marital status. The overall support of the household would be a better indicator.

Income status was a significant factor for breastfeeding initiation in the non-WIC but not in the WIC sample. In the WIC population, the majority of the sample was enrolled in Medicaid whereas in the Non-WIC population the majority were not enrolled in Medicaid. In today's social community breastfeeding is becoming more popular in the higher income population likely due to the mothers being able to stay home with the infant longer after birth making breastfeeding easier. Several population studies have shown a positive effect on cognitive development in breastfed infants, despite covariates which include socioeconomic status, education level of the parents, etc. (Anderson, Johnstone, Remley 1999) Studies such as these are very appealing to parents and could sway mothers to initiate breastfeeding. Mothers with advantage are likely to predominantly breastfeed and engage in parenting behavior that, in turn, improves children's cognitive development. (Gibbs, Forste, 2014)

Gender of the infant was not a significant factor in the breastfeeding initiation between the WIC nor the Non-WIC population. Although not significant, both populations had a greater percentage of females who were breastfed than males. It was originally thought that the social acceptance of breastfeeding a female infant may play a role in breastfeeding initiation, but it does not seem to be a significant indicator.

Birth weight of the infant was not a significant factor for breastfeeding initiation in neither the WIC nor the Non-WIC sample. In the Non-WIC population, it appears that the greater the birth weight, the greater the percentage of mothers initiating breastfeeding.

The WIC population had the highest breastfeeding initiation among the normal birth weight classification. There was a very small sample of high and low birth weight infants which could have influenced the findings.

Gestational age was significant in the WIC population but not in the Non-WIC population's decision to initiate breastfeeding. A greater proportion of the WIC participants breastfeed an infant born after 37 weeks than an infant born at or before 37 weeks. Although not significantly, the opposite was the case in the Non-WIC population with more infants being breastfed who were born at or before 37 weeks.

There are many factors that play a role in whether a mother makes the decision to initiate and continue to breastfeed. This research seeks to identify target areas for those who work with the expecting and new mother populations to increase the breastfeeding initiation to the Healthy People 2020 objective of 81.9%. The target population that these professionals should target for breastfeeding promotion programs are white women enrolled in the WIC and/or Medicaid program, those who have less than or equal to a high school education or GED, and those who give birth to high or low birth weight infants. This information could be beneficial to a WIC coordinator, those involved in public health professions for low income families such as free medical clinics or Planned Parenthood programs, as well as obstetricians, gynecologists and pediatricians who are looking to increase breastfeeding in the populations they serve.

Appendices

Appendix A-Definition of Terms

Central Kentucky- For this research project, central Kentucky will consist of Anderson, Boyle, Casey, Fayette, Garrard, Jessamine, Lincoln, Madison, Marion, Mercer, Nicholas, Pulaski, Russell, Rockcastle, Taylor, and Washington counties in Kentucky.

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)- Program that provides Federal grants to States for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children who are found to be at nutritional risk. (Food and Nutrition Service, 2012)

Fetal Macrosomia- A term used to describe a newborn who's significantly larger than average. A baby diagnosed with fetal macrosomia has a birth weight of more than 8 pounds, 13 ounces (4,000 grams), regardless of his or her gestational age.

Very Low Birth Weight- An infant who weighs less than 1500g at birth.

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